Version 1.1

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics (Pilot) 9307

Level 2, Functionality, Paper 2

Mark Scheme

2009 examination – January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
D	Marks awarded independent of method for correct use of data sheet.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$

In addition to the above, this mark scheme for functionality also contains references to the process skills being assessed in each task part. During the marking process, it became clear that a number of different process skills were often demonstrated by different candidates in answering many of the questions. Against each part, the main skill being tested is indicated in bold but other skills which candidates showed in their responses are also listed. The process skills references used within this mark scheme are listed below

Representing Making sense of the situations and representing them.
A learner can:

Ra	Recognise that a situation has aspects that can be represented using mathematics
Rb	Make an initial model of a situation using suitable forms of representation
Rc	Decide on the methods, operations and tools, including ICT, to use in a situation
Rd	Select the mathematical information to use

Analysing Processing and using the mathematics.
A learner can:

Aa Use appropriate mathematical procedures

Ab Examine patterns and relationships

Ac Change values and assumptions or adjust relationships to see the effects on answers in the model

Ad Find results and solutions

Interpreting Interpreting and communicating the results of the analysis
A learner can:

Ia Interpret results and solutions

Ib Draw conclusions in the light of the situation

Ic Consider the appropriateness and accuracy of the results and conclusions

Id Choose appropriate language and forms of presentation to communicate results and conclusions

Unit 1, Functionality, Paper 2

Q	Answer	Mark	Process skill reference	Comments
1(a)	190	B1	**Rd**	
1(b)	127 and 99 seen	M1	**Rc**, Rd	
	28	A1	**Ad**	
1(c)	Correct explanation eg, 172 is not half of 185	E1	Rd Aa, Ab Ia, **Id**	
1(d)	Fully correct explanation eg, no because it is decreasing by around 2 g / km a year **and** in 6 years time it will still be over 150 g / km	E2	Rc, Rd **Ab**, Ac Ia, **Ib**, Id	E1 For partially correct explanation eg, the rate of reduction is decreasing
1(e)	8 × 5 (= 40)	M1 dep	**Rc**	8 × 291 (= 2328)
	Their 40 × 291	M1	**Aa**	Their 2328 × 5
	11 640 or 11.64 kg	A1	**Ad**	11.64 implies M2 A0 SC1 Answer with digits 1164
1(f)(i)	12 500	B1	Rc **Ad**	
1(f)(ii)	Volkswagen Polo Blue Motion or Supermini	B1	Rc, Rd **Ia**	Allow any unambiguous indication of correct car

Q	Answer	Mark	Process skill reference	Comments
1(f)(iii)	25 000 × 198 (= 4 950 000)	M1	**Ra**, **Rb**, Rc, Rd Aa	For all three method marks allow consistent scaling of numbers
	Their 4 950 000 ÷ 2 (= 2 475 000)	M1dep		
	Their 2 475 000 ÷ 104 or 130 or 127 or 136	M1dep	Rc, Rd Aa, **Ac**	23 798 or 19 038 or 19 488 or 18 198 (or 18 199) Trial and improvement is a valid method here only if it allows the A1 to be awarded
	Toyota (small family) and 23 798 **or** Renault (family) and 19 038 **or** Ford (small MPV) and 19 488 **or** BMW (executive) and 18 199 or 18 198	A1	Ad **Ia**, Ib	If valid method seen allow a range for number of kilometres as shown Toyota 23 000 to 24 000 Renault 18 500 to 19 500 Ford 19 000 to 20 000 BMW 17 500 to 18 500 SC4 Totally unsupported answers must have the number of kilometres shown in the left hand column or the number rounded to 4 sig figs or better

Q	Answer	Mark	Process skill reference	Comments
2(a)	(19)92	B1	**Rd** Ad	
2(b)	110 ÷ 25 4.4 or 4 rem 10	M1	**Rc**	oe 4 × 25 (= 100) and 5 × 25 (= 125)
	5	A1	Ad Ia, **Ic**	
2(c)(i)	32 × 25 (= 800) or 800 ÷ 25 = 32 or 800 ÷ 32 = 25	B2	**Rc**, Rd **Id**	B1 For 32 and 25 seen
2(c)(ii)	1600 ÷ 800 (= 2)	M1	**Ra**, **Rb**, **Rc**, Rd Aa, Ab	1:15 + 30 (min) (= 1:45) | 800 linked to 30 (min)
	2 × 30 (= 60 min) or 1 (hour)	M1 dep		Their 1.45 + 30 (min) (= 2:15)
	Adds 30 (min)	M1		$1\frac{1}{2}$ or 90 implies M3
	2:45 (pm)	A1	**Ad**	oe
2(d)	424 = π *d*	M1	**Rd**	Allow π = 3 or better
	424 ÷ π	M1	Rc **Aa**	424 ÷ π seen implies M2
	134.9(…) or 135(.0…)	A1	**Ad**	SC2 Correct answer embedded
2(e)	6.3 (cm) ≤ measurement ≤ 6.7 (cm)	M1	Rc	63 (mm) ≤ measurement ≤ 67 (mm)
	Their measurement × 32	M1 dep	Rd **Aa**	Their measurement × 3.2
	208	A1	Ad	SC2 201.6 to 214.4

Q	Answer	Mark	Process skill reference	Comments
3(a)	17	B1	**Rd** Ad	Allow £0.17 with £ sign inserted
3(b)	4.6(0) × 80	M1	**Rc**, Rd	
	368(.00)	A1	**Ad**	
3(c)	124 × 3.3(0) – 120 (= 409.2 – 120 = 289.2)	M1	**Ra**, **Rb**, **Rc**, Rd Aa	
	120 × 1.05 (= 126)	M1		
	124 × 3.4(0) – their 126 (= 421.6 – 126 = 295.6)	M1 dep		Dep on second M1
	Better off and (£)6.4(0) or Better off and (£)289.2(0) and (£)295.6(0)	A1	Ad **Ia**, Ib	Allow rounded values if accurate values seen earlier
Alt 3(c)	[3.4(0) – 3.3(0)] × 124	M1	**Ra**, **Rb**, Rc, Rd Aa	= 12.4(0)
	0.05 × 120 (= 6)	M1 dep		
	12.4(0) and 6	A1	**Ad**	
	Better off	A1	Ad **Ia**, Ib	Allow rounded values if accurate values seen earlier
3(d)(i)	5 points plotted (±1 square)	B1	Rd **Aa**	(110. 9.7), (170, 10.3), (230, 4.8), (260, 8), (1250, 16.8) Ignore extra working on the graph
3(d)(ii)	Fully correct explanation that refers to **both** the trend and the exception eg, it is incorrect as the higher the wage the lower the percentage of adults receiving the minimum wage although France is an exception to this rule	E2	Aa, Ab Ia, **Ib**, **Ic**, Id	E1 For partially correct explanation eg, not correct, for example Spain has a higher minimum wage than Malta but Spain's percentage of adults is less than Malta's

Q	Answer	Mark	Process skill reference	Comments	
4(a)	10 m(illion) or 10 000 000	B1	**Rd**		
4(b)	(20)04	B1	Rd **Ib**		
4(c)	3	B1	Rd **Ab**, Ad	Marks are **not** dependent	
	15 to 18 inclusive (in 2000) 32 to 35 inclusive (in 2003)	B1	Ia, **Ic**, Id	Allow convincing answers in words eg, it's gone from about 16 to about double that at 33	
4(d)	45 to 48 inclusive – 6 to 9 inclusive (= 36 to 42 inclusive)	M1	**Rb**, Rc, Rd **Aa**	4 to 8 + 3 to 7 + 3 to 7 + 6 to 10 + 13 to 17 Must be the sum of 5 differences with 4 in the range shown	
	Their value ÷ 5 (= 7.2 to 8.4 inclusive)	M1dep		Their total ÷ 5	
	7 (from 7.2 ≤ value < 7.5) or 8 (from 7.5 ≤ value ≤ 8.4)	A1	**Ad**		
4(e)	1750 – 1400 (= 350)	M1	**Rc**, Rd Aa	$\frac{1750}{1400} \times 100$ (= 125)	$\frac{1750}{1400} - 1$ (= 0.25)
	$\frac{Their\ 350}{1400} \times 100$	M1dep		Their 125 – 100	Their 0.25 × 100
	25	A1	**Ad**		

Q	Answer	Mark	Process skill reference	Comments
5(a)	33	B1	**Rd**	
5(b)(i)	$\frac{2}{3} \times 135$	M1	**Rc**	oe eg, $135 - \frac{1}{3} \times 135$ Allow 0.66×135 or better
	90	A1	**Ad**	
5(b)(ii)	$50 \div 8$ or 6.2(5) or 6.3 or 6 rem 2	M1	**Rc**	oe 8×6 (= 48) and 8×7 (= 56)
	7	A1	Ad Ia, **Ic**	
5(c)	$2 \times 33 + 2 \times 27$ (= 66 + 54 = 120) or $2 \times 33 + 2 \times 28$ (= 66 + 56 = 122) or $2 \times 40 + 2 \times 33$ (= 80 + 66 = 146) or $2 \times 38 + 2 \times 31$ (= 76 + 62 = 138)	M1	**Ra**, **Rb**, Rc, Rd	Attempt at accommodation cost for the family per night
	Sum of at least four numbers using 23 and/or 13 and/or 5 or Sum of at least 4 numbers using 28 and/or 18 and/or 10 or Sum of at least four numbers using 27 and/or 17 and/or 10	M1	Aa	Attempt at the total cost of at least one activity for each family member Allow consistent misreads only
	One correct plan	A1 ft	Ab, **Ac**, **Ad** **Ia**, Ib, Ic, Id	A marks **cannot** be awarded if misreads have been made ft From their accommodation total and their activities total that would give a total cost between £500 and £600 inclusive
	Correct total cost	A1		Do **not** ft
	A different correct plan **and** the correct total	A1		Do **not** ft